March Newsletter 2025

AUSTRALIAN BATTERY SOCIETY

A Lucky Accident

by Ruben Muller

Insights from one of the attendees at the Australian Battery Society Networking Session

Some time ago, I signed up for the **Australian Battery Society** because, well, anything battery-related is right up my alley.

Last month, I received an invite to one of their events, an evening of presentations, networking, and (to seal the deal) free food and drinks 👊. It sounded like a great opportunity, so I signed up without a second thought.

When I arrived, I quickly realised that this was not quite what I had expected. Rather than being full of lithium battery suppliers like Muller Energy, the room was buzzing with postgraduate students and researchers. The discussions were not about the electrical aspects of batteries, like discharge rates or BMS technology, but instead focused on battery chemistry – lattice structures, electrode materials, and cutting-edge innovations in anode technology.

Now, if you have not yet seen my inner geek, here is the reveal! While chemistry has not been a major part of my career, I have always found it fascinating. Back in high school and university, it was one of my favourite subjects. Even after that, I would regularly chat with my dad (who had a PhD in chemistry) about all things chemistry and science.

So, after the initial surprise, I switched gears and dove into the discussions. And I am glad I did.

One of the most interesting presentations was about high silicon anodes, which could significantly boost battery energy density. That is something worth keeping an eye on for the future.

In this newsletter you will find:

I also had some valuable discussions around supply chains and the circular economy, especially Australia's current lack of local cell manufacturing and the importance of lithium battery recycling. Speaking of which, I was invited to visit one of Australia's research recycling labs and even bring some of our faulty cells along. While Muller Energy's failure rate is extremely low, like any battery company, we do have a few defective cells (mainly from overzealous prototyping).

All in all, while the event took me a little outside my usual expertise, it turned out to be an incredibly valuable experience. I learnt a lot, made some great connections, and walked away with new insights into where battery technology is heading.

Would I attend again? Absolutely. And next time, I will be expecting the chemistry deep dive!

Ruben is the CEO of Muller Energy PTY LTD. Muller Energy is an Australian company based in Somersby, New South Wales. They specialise in providing high-quality custom lithium batteries, including LiFePO4 cells, for a variety of applications. If you are interested in talking to Ruben, please drop him a line at: ruben@mullerenergy.com.au

Australian Industry Update

By Clelia Nelson

Tesla to Establish Battery Repair Facility in Western Australia

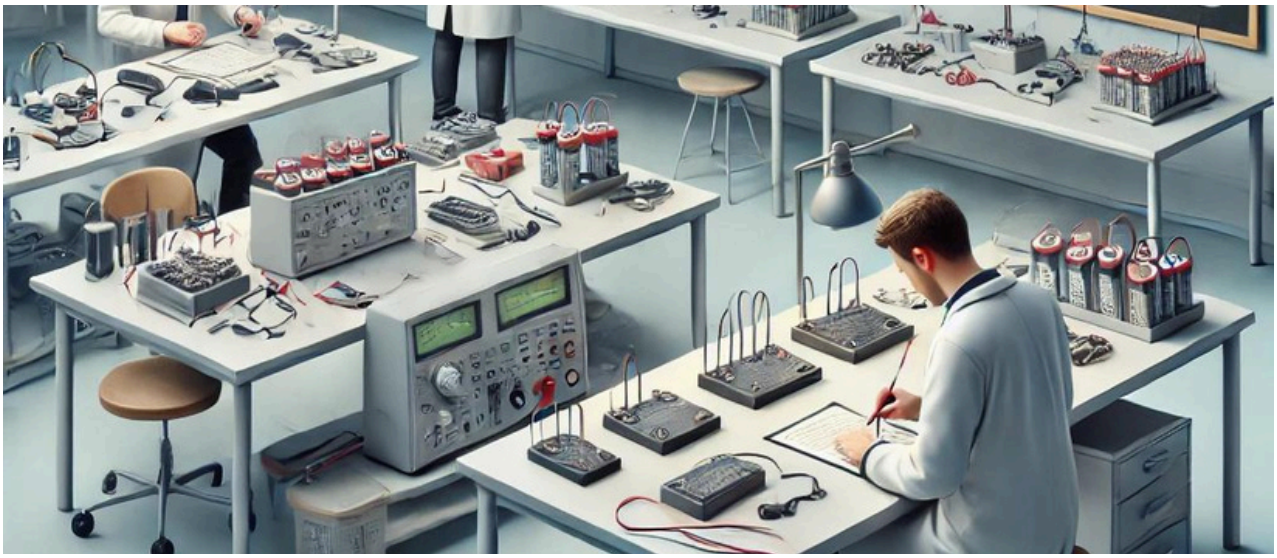
Tesla has partnered with the government of Western Australia to build a battery repair facility in Collie, a former coal-mining hub undergoing economic transformation. This facility will service, repair, and renew Tesla's grid-scale Megapack batteries, including those used in Neoen's Collie Battery Energy Storage System, which is expanding to a capacity of 560 MW/2,240 MWh. The plant is expected to employ up to 50 local workers and, once fully operational, will also handle residential Powerwall batteries and electric vehicle charging equipment.

Livium Secures $30 Million Grant for LFP Battery Demonstration Plant

Livium Ltd's subsidiary, VSPC Pty Ltd, has been awarded a grant of up to A$30 million by the Australian Renewable Energy Agency (ARENA) to construct and operate a lithium iron phosphate (LFP) battery cathode powder demonstration plant. The facility aims to validate VSPC's proprietary 'RC Process' technology over a two-year operational period, during which the company plans to secure binding offtake agreements to facilitate commercial-scale production. This initiative positions Australia to enhance its role in advanced battery manufacturing and diversify global supply chains.

ARENA and EVX Collaborate to Expand Kerbside EV Charging Across Australia

The Australian Renewable Energy Agency (ARENA) has committed $2.4 million to EVX Australia Pty Ltd for the installation of 250 public kerbside electric vehicle (EV) chargers across over 60 local government areas in Victoria, New South Wales and South Australia. By utilising existing power poles in urban and residential areas, this initiative aims to make EV charging more accessible, particularly for those without home charging options. The Australian-designed and manufactured pole-mounted chargers feature smart charging capabilities, minimising impact on the local electricity grid and facilitating a streamlined rollout. This project is part of ARENA's Driving the Nation Program, which seeks to support the uptake of EVs nationwide.



What Have Australian Researchers Been Up To?

By Dawei Su

Vanadium-doped Li_2TiSiO_5 anodes for boosting capacity and cycling stability of lithium-ion batteries

Journal of Materials Chemistry A Vol. 13, pp. 7804–7812, 2025.
DOI: 10.1039/d4ta08073d

Prof. Pingan Song from the University of Southern Queensland and his collaborators recently reported that Li_2TiSiO_5 (LTSO) is a promising anode material for lithium-ion batteries with a stable structure and a favorable operating potential of 0.28 V vs. Li^+/Li. They introduce vanadium (V)-doping to synthesise $Li_2Ti_{1-x}V_xSiO_5$ (x = 0, 0.25, 0.5, 0.75) via a sol-gel method. The optimised $Li_2Ti_{0.95}V_{0.05}SiO_5$ anode exhibits a high reversible capacity of 235 mAh g^{-1} after 130 cycles at 0.5 A g^{-1}—almost three times that of pristine LTSO. V-doping enhances conductivity, improving cycling stability and rate performance. This work provides a simple strategy for designing high-performance LTSO anodes, paving the way for advanced silicon-based materials in high-power LIBs.

Advances in sweat-activated batteries for powering wearable electronics: structures, materials, challenges, and perspectives

Journal Of Physics Energy, Vol. 7, 2025.
DOI10.1088/2515-7655/ad92aa

Sweat-activated batteries (SABs) have emerged as a promising solution for energy generation and storage in wearable electronics. The leading researcher from the University of New South Wales, Prof. Dewei Chu, recently, reviewed SAB development, categorising them into conventional redox batteries, metal-air batteries, and others, based on two primary anode materials: magnesium and zinc. The working mechanisms, electrolyte compositions, and integration with wearable substrates are analysed. Additionally, various SAB applications are discussed. By summarising recent advances and key challenges, this review offers insights into SAB technology, providing valuable guidance for future research and applications in self-powered wearable devices.

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Opportunities

Electrify your battery research in the USA with a grant from the CSIRO Australia-US Researcher Exchange Network

Australia's national science agency, CSIRO, is offering Australian researchers the opportunity to advance the future of battery technology through research grants of up to $30,000. These grants will fund 1-3 month exchanges to the USA, fostering collaboration and knowledge sharing with leading US institutions.

The Australia-US Researcher Exchange Network aims to strengthen Australia-US research ties, build Australian research capacity in battery technology, and ultimately contribute to the development of a robust and sovereign Australian battery industry.

This is your chance to deepen your expertise, boost your career and make a real impact on the future of energy storage.

Act now to:

- advance your battery research & development
- access cutting-edge facilities
- develop commercialisation opportunities for Australian battery technology
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- expand your North American network.

For more information or to apply, visit www.csiro.au/battery-research-grants
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Young Scientists, Your Chance to Win $1500 First Prize Or One of Two $750 Runner Up Prizes!

If you are a young scientist you can enter ATA's Science Award Competition to win one of the Encouragement Awards. The awards are intended to provide you with financial assistance to attend a relevant science conference or to further your research or studies. **To know more about the award and enter, check here: https://www.atascientific.com.au/awards-events-training/current-award/**

Do you have an opportunity to share?

If you have open positions, PhD, Masters, Post-docs, Technicians, Engineers, etc... in the battery space, please let us know (admin@australianbatterysociety.org), we would love to include here.

Did we miss anything? If so, please drop us a line at admin@australianbatterysociety.org

With that, best wishes to all our subscribers and all involved in batteries in Australia,
Dr. Dipan Kundu, and **Dr. Binayak Roy** on behalf of **The Australian Battery Society**

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In-situ X-ray Diffraction on a $LiCoO_2$ Pouch Cell Battery

High resolution, Better Insights

The electric vehicle (EV) market has grown significantly, with a 400% increase in market share between 2015 and 2019, reaching 2.5%. This trend is expected to continue, with an estimated 30% market share by 2030. A key challenge in this transition is developing advanced batteries that offer high capacity, fast charging, long lifespans, and safety in all conditions, including accidents.

To address these challenges, understanding the structure-property relationships of battery materials is critical. X-ray diffraction (XRD) is a valuable tool for analyzing these materials, providing non-destructive insights throughout the battery lifecycle. The most common battery formats include pouch, prismatic, coin, and cylindrical cells, with this report focusing on pouch cells due to their suitability for research and XRD studies. During charging and discharging, lithium ions intercalate into the material, causing structural changes that XRD can detect in real-time.

XRD measurements face challenges, such as the need for higher-energy X-rays to penetrate the cell's layers. The report describes experiments using XRDynamic 500 – Anton Paar's automated XRD platform, to study the structural changes in pouch cells with different current collectors, using a high-energy X-ray source and optimized transmission geometry for in-situ measurements.

Perfect for battery research

From phase identification at ambient conditions to observation of structural changes in-situ or operando, X-ray diffraction is an essential tool for the development of the next generation of battery materials.

ACCESS THE APPLICATION REPORT

https://loom.ly/auHbDHY

All measurements presented here show the importance of high resolution, high signal-to-noise ratio and low measurement background to correctly identify all minor phases, and to precisely identify peak shifts, even if these are only minor.

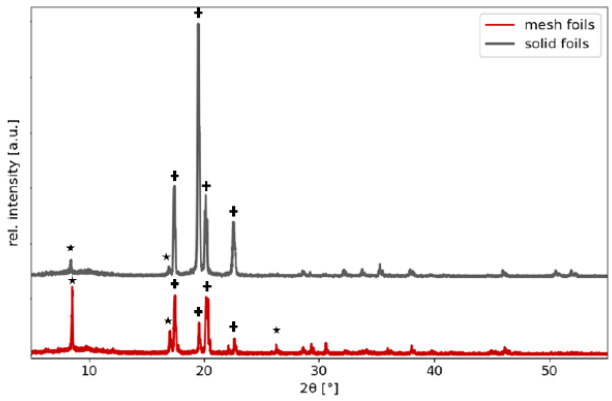

Figure 1. Comparison of diffractograms of $LiCoO_2$ pouch cells with solid foil current collectors (grey) and with mesh foil current collectors (red). + symbols indicate reflections of the metal foils, * symbols of the active material.

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Intellectual Property in Battery Technologies

What is IP?

Intellectual Property (IP) is a product or creation of the mind and a valuable business tool when captured in asset form. In batteries, IP is everywhere. It is in battery design and functionality, both technical and aesthetic features, in trade secrets and know-how that provides a competitive advantage, in the branding that conveys credibility and quality to customers, and the documents and websites that customers use.

The most common forms of IP related to batteries are:

- **Patents**, which protect the functionality of a cell, module or pack including its component parts, device control systems, packaging, fabrication and formation processes and manufacturing, novel device charging and discharging processes, novel applications, critical mineral and component recovery, and recycling methods;
- **Trade marks**, which protect the brand, such as name or logo, of a business, product or service;
- **Industrial designs**, which protect the visual appearance of a product, including a product's look and feel; and
- **Copyright**, which protects the expression of information or content, such as manuals or product information.

There are also other valuable forms of IP relevant to the battery sector, including trade secrets, know-how, and confidential information.

Why should you care about IP?

IP is a business tool used for:

- **Attracting investors** – Investors want assurance you are protecting your IP so that their investment is protected and returns are stronger.
- **Adding assets to the balance sheet** – Particularly for early-stage companies, the value of IP assets can significantly increase the value of a business, and often are the main source of balance sheet value in a presales business.
- **Marketing** – Tell others that you value your brand/products/technology by protecting it and creating a niche or strong foothold in a market.
- **Building a moat** – Deter competitors from copying your IP by establishing a defendable and deterrent position that keeps you ahead in the race for future innovation.
- **Revenue through licensing** – License to other parties such as manufacturers and distributors to use your IP in return for revenue.

And, if the need for enforcement arises, negotiations with other parties can be strengthened with well protected IP assets and can lead to more favourable licensing agreements, such as higher royalty and milestone payments.

Getting help with your IP

While the concept of IP can be simple, protecting the right IP can be quite complex as there is no "one size fits all" approach. For maximum value, your IP strategy needs to be aligned to your business strategy. Also, often the earliest actions taken to protect IP are the most important ones; it therefore pays to get it right from the start by speaking to a professional IP attorney.

Phillips Ormonde Fitzpatrick is one of Australia's oldest independent specialist IP firms, having provided Australians and their businesses with IP support for over 130 years. We are more than just attorneys and lawyers – we are scientists, engineers and technical specialists. Our people have a personable client focus, where we place great emphasis on developing relationships and providing tailored IP solutions across a broad range of technologies. We are the trusted providers of IP services for many notable Australian organisations, including Australia's leading research organisation and several major universities.

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SCAN ME

Battery manufacturing: Reliable, adaptable particle sizing

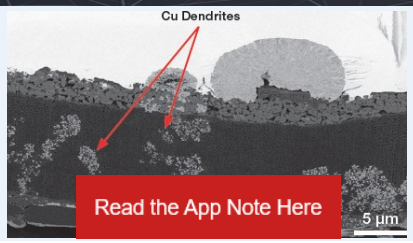
Ensuring that particles used in battery materials are correctly sized is essential for problem-free manufacturing and optimised battery performance. The new Mastersizer 3000+ with SOP Architect, Data Quality Guidance and Size Sure allows anyone to create perfect methods and analyse samples quickly with confidence.

Accelerate battery cathode material QC with automated SEM imaging and analysis

Thermo Scientific™ Phenom™ ParticleMetric Software, offers SEM automation to assess NCM (nickel cobalt manganese oxide) cathodes and its precursors to accelerate QC and manufacturing processes.

Automated impurity analysis for lithium-ion batteries with Perception Software

Thermo Scientific™ Perception™ Software automates analysis of impurity particles during lithium-ion battery manufacturing to enhance quality control processes and ensure the safety and reliability of lithium-ion batteries.



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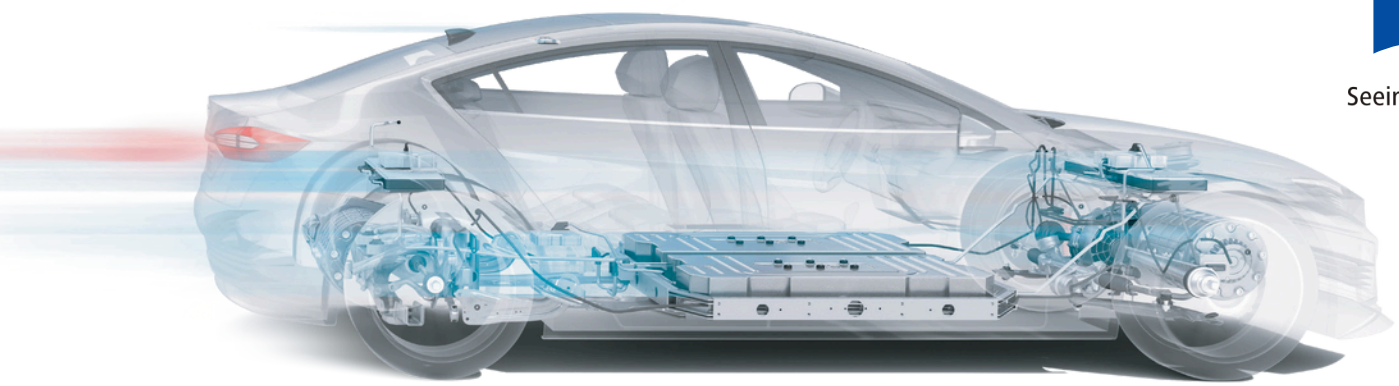


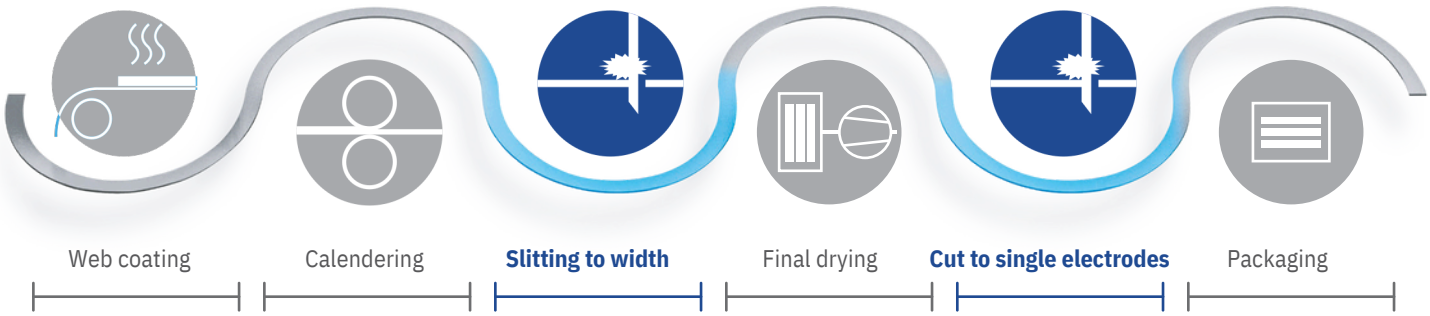
ZEISS

Seeing beyond

A Deep-dive into NEV Application

Solution: Digital Microscope Burr Inspection of Battery Electrode

Application Insight



Burr and other defects introduced during the slitting and cutting process will impact the battery performance and will increase the risks of internal shorts that can cause serious safety issues. e.g. battery heating, ignition.

Slitting to width

Inspection tasks:

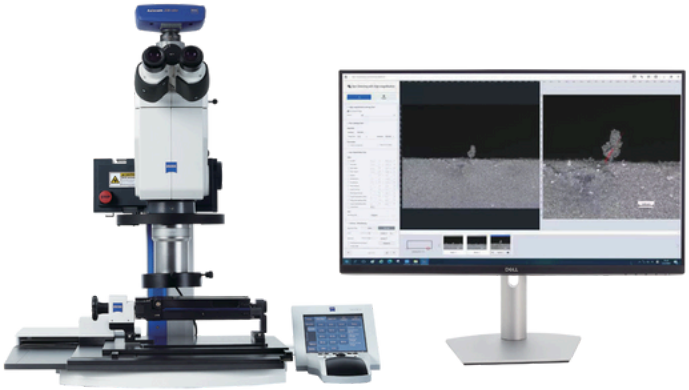
- Horizontal burr
- Vertical burr
- Waves edge
- Delamination
- Foil crack

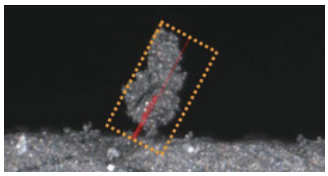
Cut to single electrodes

Inspection tasks:

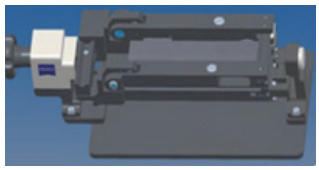
- Horizontal burr
- Vertical burr
- Waves edge
- Delamination
- Foil crack
- Burr on the tab and notch
- Heat affected zone by laser
- Dross by laser

- Requirements in blue characters can be solved with current solution
- Requirements in gray characters can be customized by the ZEISS solu tion development team. These applications may require ZEISS Al technology, which necessitates an adequate number of example image inputs for the Al model training.





Burr detection algorithm can easily find 3 types of burrs



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